

PRELIMINARY COMPARISONS BETWEEN THE AVIFAUNAS
OF THE NORTH NANDI AND KAKAMEGA FORESTS

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The North Nandi Forest (on the equator and at 35°E.) lies at c.2000 m above sea level on the edge of the Nandi escarpment about 5 km east of Kakamega Forest which is some 300 m lower (Fig.1). Originally the two forests must have been connected, both directly by forest extending down the escarpment and indirectly via the South Nandi Forest, but they now form separate forest blocks. The gazetted North Nandi Forest Reserve covers 119 km², within which indigenous forest covered about 93 km² in 1976, having decreased by about 3 - 5 km² per year over the previous 13 years (Ochanda 1978). There are no published records of the avifauna; it would be expected to contain elements of both the central African avifauna (of which Kakamega Forest is normally considered the eastern limit) and the East African highland avifauna centred east of the Kenya rift valley. Some records that must originate from North Nandi are included in Zimmerman and Forbes-Watson's (1972) list of species from the 'Kakamega-Nandi region' but this list does not make clear which species are known from which part of this region.

We visited the North Nandi Forest from 3 to 9 January 1978. Our first camp, about 2 km north of Chepyagoris (= Chepyegoris), was in forest so degraded by browsing cattle that we could not set mist-nets, so, on 4 January we moved south to dense forest along a logging track near a forest guard post 2 km west of Kapkuto village. We set up mist-nets that day and the next, operating them continuously until late on 8 January. In addition to birds caught in nets, we identified as many species as we could by general observation, and collected 25 specimens of 24 species for the National Museums of Kenya. In view of the threatened status of this forest and many of its birds, we did not attempt to make a fully representative collection.

RESULTS

Comparisons with the well known Kakamega Forest avifauna are based partly on Zimmerman (1972) and partly on mist-netting data (chiefly AWD's) from the area immediately north of the Kakamega Forest Station, where Zimmerman did most of his work and AWD has netted sporadically from 1976 to 1979. Our comparisons are therefore strictly between two sites, one in each forest, and may need to be modified if data from other sites in either forest become available.

The 80 species that we identified are listed in Table 1. The list is of course incomplete, representing only 10 man-days of effort that was concentrated primarily on mist-netting in a very small area. Nevertheless, the list shows that the avifauna is similar to that of the Kakamega Forest, containing a number of species for which Kakamega (or Kakamega and Elgon) has previously been the only known locality in Kenya (notably *Phylloscopus budongoensis*, *Kakamega poliothorax*, *Cossypha cyanocampter*, *Neocossyphus poensis*, *Andropadus masukuensis* and *Bleda syndactyla*). There are, however, some interesting differences, some of which can be attributed to the higher altitude of the North Nandi Forest; these are discussed below.

1. *Trochocercus* spp. and *Erannornis longicauda*: crested flycatchers. *T. nigromitratus* is the only species found within the Kakamega Forest, where it is netted quite frequently; in North Nandi we caught only *T. albonotatus*. This is probably a genuine case of altitudinal replacement, since *T. albonotatus* is characteristic of montane forest, and *T. nigromitratus* of lowland forest, in Africa generally (Hall & Moreau 1970). *E. longicauda* occurred outside the forest in isolated trees, and along the edge, at North Nandi as it does at Kakamega.

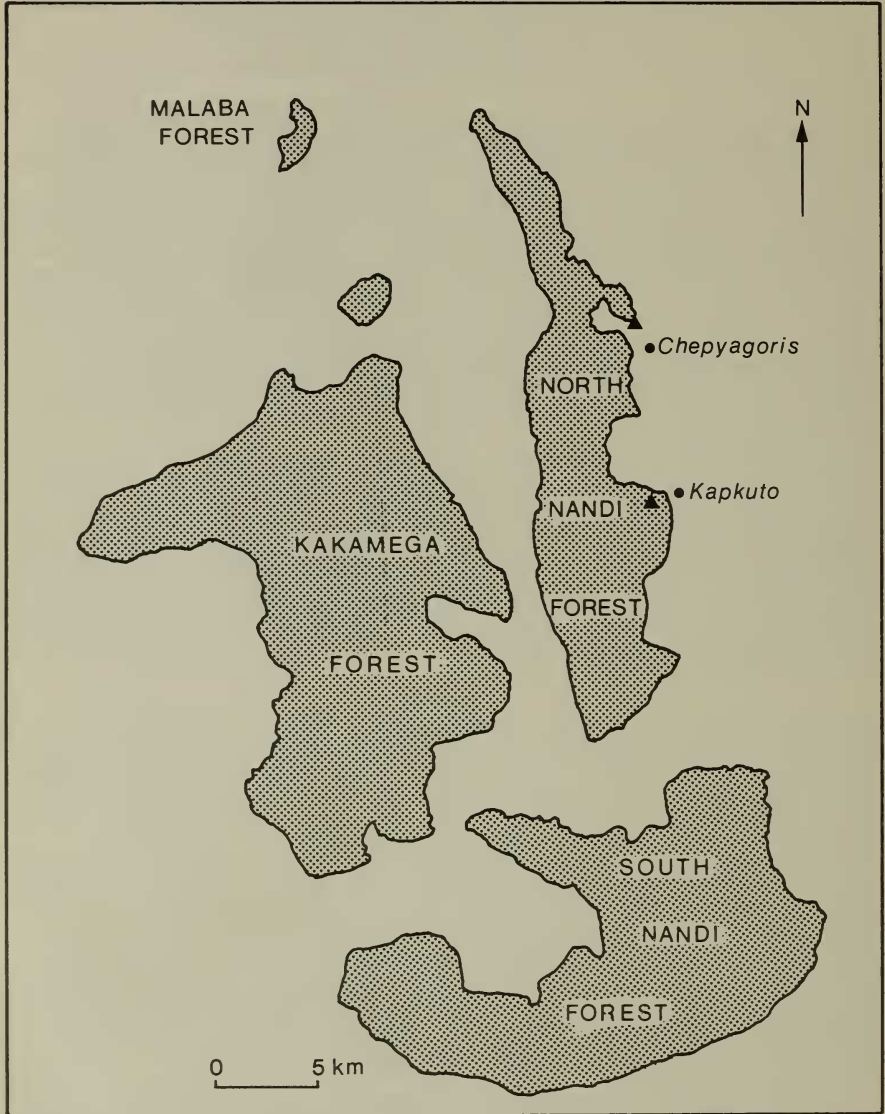


Fig. 1 Locations of places named in the text.

▲ = camp, ● = village

2. Timaliidae: babblers.

In Kakamega Forest four species of *Trichastoma* are netted: *albipectus*, *rufipennis*, *fulvescens* and *pyrrhoptera* in descending order of abundance, *pyrrhoptera* being much the rarest. At North Nandi we caught only *pyrrhoptera* and *albipectus*; it is tempting to ascribe this difference partly to altitudinal replacement of the lowland *rufipennis* by the montane *pyrrhoptera*, again following Hall & Moreau (1970), but we resist this temptation because in Malaba Forest, 10 km north of Kakamega Forest but at the same altitude, *pyrrhoptera* is also the most commonly netted *Trichastoma* (AWD pers. obs., see also E.A.N.H.S. 1978:122).

Kakamega poliothorax is very rare at the Kakamega Forest Station site. Zimmerman (1972), for example, did not record it at all and C.F. Mann described it as scarce in the Kakamega and South Nandi Forests between 1560 and 1700 m (Mann, Burton & Lennerstedt 1978). It is apparently more common in North Nandi, where we caught four.

We have never caught or seen the babbler *Alcippe abyssinica* at Kakamega Forest Station, but at North Nandi we netted nine and are confident that its abundance there represents a genuine altitudinal difference.

3. *Sylvietta leucophrys* White-crowned Crombec.

This species does not occur in Kakamega Forest, but at North Nandi we caught three and saw it often. It is characteristic of montane forest throughout its range (Hall & Moreau 1970).

3. *Indicator* spp.: honeyguides.

We caught five individuals of three species, far more than would be caught at Kakamega in a comparable amount of netting time, but we do not attribute this to a real avifaunal difference between the two forests. We have noticed elsewhere that honeyguides seem to be attracted to the smoke of a wood fire, and at North Nandi most of our nets were within 100 m of a large camp-fire whereas at Kakamega we do not light fires. It seems likely that the fire at North Nandi attracted more honeyguides into the vicinity of the nets than would normally have been there.

4. Pycnonotidae: greenbuls.

Twelve pycnonotids occur in the Kakamega Forest, apart from the ubiquitous *Pycnonotus barbatus*; we recorded only six species at North Nandi. Some of the notable absences were of species that are rare even at Kakamega, and might have escaped notice in a week spent there, notably *Andropadus ansorgei*, *A. gracilis* and *Phyllastrephus baumanni*, and their absence from our list might reflect inadequate searching. Our failures to find *Chlorocichla laetissima*, a noisy and conspicuous species at Kakamega, and *Andropadus virens* which is commonly netted there, are harder to explain.

5. *Platysteira* spp.: wattle-eyes.

Four species occur regularly in Kakamega Forest, all of which would normally be caught in a netting effort comparable to that used at North Nandi. However, we caught none of these at North Nandi, instead recording only *P. peltata* which is absent from Kakamega Forest and which commonly replaces *P. cyanea* in montane forest (Hall & Moreau 1970).

DISCUSSION

Only 59 of the 80 species we recorded in North Nandi would normally be regarded as forest birds; this number of forest species is clearly incomplete and so cannot be compared quantitatively with the 100-plus species listed by Zimmerman (1972) for his study area in Kakamega Forest. However, it is perfectly valid to compare the species we caught in mist-nets at North Nandi with those caught with a comparable netting effort at the Kakamega Forest Station site,

TABLE 1

Species recorded in North Nandi Forest 3 - 9 January 1978

<i>Bostrychia hagadash</i>	Hadada Ibis	
<i>Circaetus pectoralis</i>	Black-chested Harrier Eagle	
<i>Lophaelus occipitalis</i>	Long-crested Eagle	E
<i>Milvus migrans</i>	Black Kite	
<i>Balearica pavonina</i>	Crowned Crane	
<i>Turtur tympanistria</i>	Tambourine Dove	F
<i>Poicephalus meyeri</i>	Brown Parrot	
<i>Chrysococcyx cupreus</i>	Emerald Cuckoo	E
<i>C. klaas</i>	Klaas' Cuckoo	
<i>Cuculus solitarius</i>	Red-chested Cuckoo	FE
<i>Colius striatus</i>	Speckled Mousebird	
<i>Bycanistes subcylindricus</i>	Black and White Casqued Hornbill	FE
<i>Tockus alboterminatus</i>	Crowned Hornbill	F
<i>Merops oreobates</i>	Cinnamon-chested Bee-eater	E
<i>Phoeniculus bollei</i>	White-headed Wood Wood Hoopoe	F
<i>Gymnobucco bonapartei</i>	Grey-throated Barbet	EC
<i>Lybius bidentatus</i>	Double-toothed Barbet	E
<i>Pogoniulus bilineatus</i>	Golden-rumped Tinkerbird	FC
<i>Trachyphonus purpuratus</i>	Yellow-billed Barbet	Fc
<i>Indicator exilis</i>	Least Honeyguide	Fc
<i>I. indicator</i>	Black-throated Honeyguide	E
<i>I. minor</i>	Lesser Honeyguide	F
<i>I. variegatus</i>	Scaly-throated Honeyguide	F
<i>Campothera tullbergi</i>	Fine-banded Woodpecker	Fc
<i>Dendropicos fuscescens</i>	Cardinal Woodpecker	F
<i>Coracina caesia</i>	Grey Cuckoo Shrike	FEC
<i>Estrilda nonnula</i>	Black-crowned Waxbill	
<i>Nigrita canicapilla</i>	Grey-headed Negrofinch	E
<i>Spermophaga ruficapilla</i>	Red-headed Bluebill	Fc
<i>Serinus burtoni</i>	Thick-billed Seed-eater	E
<i>Psalidoprocne albiceps</i>	White-headed Rough-wing	
<i>P. pristoptera</i>	Black Rough-wing	
<i>Dryoscopus angolensis</i>	Pink-footed Puff-back	FE
<i>Laniarius luehderi</i>	Luhder's Bush Shrike	FEC
<i>Lanius mackinnoni</i>	Mackinnon's Shrike	E
<i>Malaconotus bocagei</i>	Grey-green Bush Shrike	FE
<i>Anthus trivialis</i>	Tree Pipit	
<i>Motacilla aguimp</i>	African Pied Wagtail	
<i>M. clara</i>	Mountain Wagtail	
<i>Melaenornis chocolatina</i>	White-eyed Slaty Flycatcher	E
<i>Muscicapa adusta</i>	Dusky Flycatcher	E
<i>Erannornis longicauda</i>	Blue Flycatcher	Ec
<i>Platysteira peltata</i>	Black-throated Wattle-eye	F
<i>Trochocercus albonotatus</i>	White-tailed Crested Flycatcher	FC
<i>Apalis cinerea</i>	Grey Apalis	FEC
<i>A. pulchra</i>	Black-collared Apalis	Ec
<i>A. rufogularis</i>	Buff-throated Apalis	F
<i>Bathmocercus cerviniventris</i>	Black-faced Rufous Warbler	F
<i>Camaroptera brachyura</i>	Grey-backed Camaroptera	E
<i>C. chloronata</i>	Olive-green Camaroptera	F
<i>Cisticola chubbii</i>	Chubb's Cisticola	c

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TABLE 1 continued:

<i>Phylloscopus budongoensis</i>	Uganda Woodland Warbler	F
<i>Prinia bairdii</i>	Banded Prinia	F
<i>Sylvietta leucophrys</i>	White-browed Crombec	Fc
<i>Alcippe abyssinica</i>	Abyssinian Hill Babbler	F
<i>Kakamega poliothorax</i>	Grey-chested Illadopsis	Fc
<i>Trichastoma albipectus</i>	Scaly-chested Illadopsis	Fc
<i>T. pyrrhoptera</i>	Mountain Illadopsis	F
<i>Alethe poliocephala</i>	Brown-chested Alethe	F
<i>Cossypha cyanocampter</i>	Blue-shouldered Robin Chat	Fc
<i>C. niveicapilla</i>	Snowy-headed Robin Chat	F
<i>Neocossyphus poensis</i>	White-tailed Ant Thrush	Fc
<i>Sheppardia aequatorialis</i>	Equatorial Akalat	Fc
<i>Turdus abyssinicus</i>	Northern Olive Thrush	E
<i>Nectarinia olivacea</i>	Olive Sunbird	F
<i>N. preussi</i>	Northern Double-collared Sunbird	E
<i>N. verticalis</i>	Green-headed Sunbird	E
<i>Parus albigentris</i>	White-bellied Tit	E
<i>P. funereus</i>	Dusky Tit	FE
<i>Ploceus insignis</i>	Brown-capped Weaver	F
<i>P. melanogaster</i>	Black-billed Weaver	F
<i>Andropadus curvirostris</i>	Cameroon Sombre Greenbul	Fc
<i>A. gracilirostris</i>	Slender-billed Greenbul	E
<i>A. latirostris</i>	Yellow-whiskered Greenbul	FcE
<i>A. masukuensis</i>	Shelley's Greenbul	F
<i>Bleda syndactyla</i>	Bristlebill	Fc
<i>Phyllastrephus placidus</i>	Placid Greenbul	Fc
<i>Pycnonotus barbatus</i>	Common Bulbul	E
<i>Poeoptera stuhlmanni</i>	Stuhlmann's Starling	FE
<i>Zosterops senegalensis</i>	Yellow White-eye	FcE

Notes: F = forest, E = edge, c = collected, no symbol: not associated with forest.

and this comparison is set out in Table 2. Although the netting effort at North Nandi was confined to early January, whereas that at the Kakamega Forest Station site was spread over the nine months June to February, there was little seasonal variation in species composition at the latter site. The actual numbers of individuals caught will depend on several factors that may differ between the two forests, such as the density of vegetation at mist-net height, the 'net-shyness' of the birds and various other factors; the species caught are therefore listed in rank order of frequency of capture, and comparisons made between ranks rather than absolute numbers caught.

Of the four commonest species in each forest, three are shared (*Andropadus latirostris*, *Phyllastrephus placidus* and *Sheppardia aequatorialis*); the major differences are the abundance in North Nandi of *Alcippe abyssinica*, which does not occur in the Kakamega Forest Station area, and the greater abundance in Kakamega of *Nectarinia olivacea*. Thus the numerically dominant species in the two forests are much the same, the chief differences being found in the rarer species.

To make a quantitative comparison between the two avifaunas we can treat the lists of mist-netted species as independent samples of the avifauna of each forest, and calculate an index of similarity between them based on the number of species held in common by the two forests. A suitable index is Sorensen's,

given by $Q_s = \frac{2j}{a+b}$ where j is the number of species common to the two forests, and a and b are the total numbers of species found in the two forests. The index ranges from 0 for two samples with no species in common, to 1 for samples with all species in common (Southwood 1971).

In this case $Q_s = \frac{2 \times 20}{35+39} = 0.54$

One of the more interesting problems in biogeography is to assess the extent to which the distribution of one group, in this case birds, is dependent on the ecology of the habitat it occupies, in this case forest; is the distribution of the avifauna closely tied to that of forest trees, or are other factors such as competition, palaeoclimatic history and so forth, also important? One approach to this problem is to compare the similarity of the two avifaunas with that of the floras of the areas they occupy. In this case we can use lists of tree species recorded in the reconnaissance inventory of indigenous trees of Kenya (Forest Department 1973); using the species lists for Kakamega Forest and Nandi Forest, we can calculate Q_s for trees as $\frac{2 \times 39}{56+51} = 0.73$. Thus the vegetation of the two forests seems to be more similar than their avifaunas, suggesting that factors other than the floristic composition of their habitat may be important in determining forest bird distribution.

TABLE 2

Relative abundance of species mist-netted in North Nandi and Kakamega Forests

Species	Rank order of abundance in	
	North Nandi	Kakamega
<i>Andropadus latirostris</i>	1	1
<i>Phyllastrephus pacidus</i>	2	3
<i>Sheppardia aequatorialis</i>	3	4
<i>Alcippe abyssinica</i>	4	x
<i>Prinia bairdii</i>	5	12=
<i>Apalis pulchra</i>	6=	32=
<i>Cossypha cyanocampter</i>	6=	14=
<i>Spermophaga ruficapilla</i>	6=	7
<i>Bathmocercus cerviniventris</i>	9	8
<i>Pogoniulus bilineatus</i>	10=	22
<i>Trichastoma pyrrhoptera</i>	10=	-
<i>Bleda syndactyla</i>	10=	19=
<i>Alethe poliocephala</i>	10=	5
<i>Andropadus curvirostris</i>	14=	6
<i>Ploceus melanogaster</i>	14=	-
<i>Trichastoma albipectus</i>	14=	10
<i>Kakamega poliothorax</i>	14=	-
<i>Zosterops senegalensis</i>	14=	-
<i>Nectarinia olivacea</i>	19=	2
<i>Sylvietta leucophrys</i>	19=	x
<i>Trochocercus albonotatus</i>	19=	x
<i>Estrilda nonnula</i>	22=	-
<i>Indicator minor</i>	22=	-
<i>I. variegatus</i>	22=	-
<i>Laniarius luehderi</i>	22=	32=
<i>Nectarinia preussi</i>	22=	-

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TABLE 2 continued:

	North Nandi	Kakamega
<i>Platysteira peltata</i>	22=	x
<i>Cossypha niveicapilla</i>	28=	32=
<i>Indicator exilis</i>	28=	-
<i>Camaroptera brachyura</i>	28=	32=
<i>Nectarinia verticalis</i>	28=	32=
<i>Neocossyphus poensis</i>	28=	32=
<i>Melaenornis chocolatina</i>	28=	-
<i>Nigrita canicapilla</i>	28=	24=
<i>Serinus burtoni</i>	28=	-
<i>Platysteira blissetti</i>	x	9
<i>Camaroptera chloronata</i>	-	11
<i>Andropadus virens</i>	x	12=
<i>Trochocercus nigromitratus</i>	x	14=
<i>Hylia prasina</i>	x	16=
<i>Trichastoma rufipennis</i>	x	16=
<i>Andropadus masukuensis</i>	-	18
<i>Phyllastrephus baumanni</i>	x	19=
<i>Trichastoma fulvescens</i>	x	19=
<i>Phylloscopus budongoensis</i>	-	22=
<i>Platysteira concreta</i>	x	24=
<i>Ploceus bicolor</i>	x	24=
<i>Turtur tympanistria</i>	-	24=
<i>Andropadus ansorgei</i>	x	28=
<i>Platysteira castanea</i>	x	28=
<i>Terpsiphone viridis</i>	x	28=
<i>Dendropicos fuscescens</i>	-	31
<i>Buccanodon duchaillui</i>	x	32=
<i>Campethera caroli</i>	x	32=
<i>Platysteira cyanea</i>	x	32=

Notes: x = not recorded in that forest, - = recorded, but not netted in sample. The North Nandi sample was 208 birds of 35 species, caught in 44 400 net-foot-hours (approximately 13 500 net-metre-hours), one net-foot-hour is one foot of mist-net set for one daylight hour, operated continuously from 4 to 8 January 1978. The Kakamega sample was 483 birds of 39 species, in 44 700 net-foot-hours (approximately 13 600 net-metre-hours) on seven separate occasions over a period of nine months (June 1976 to February 1977). Neither sample includes retraps or Palaearctic migrants (Blackcap *Sylvia atricapilla*, caught only at Kakamega) but both include species normally considered as 'edge' species because they were caught in the same nets as 'forest' species and to exclude them would be difficult to justify.

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